Two Dimensional Linkage Study Methods and Related Inventions

The present patent application is a continuation-in-part of U.S. Patent Application 09/947,768 (filed 5 SEPT 2001). And 09/947,768 claims priority from US Provisional 60/230570 (filed 9/5/2000). Patent Application 09/947,768 is a continuation-in-part of U.S. Patent Application 09/623,068 (filed 26 AUG 2000). The present patent application is also a continuation-in part of Patent Application 09/623,068 (filed 26 AUG 2000). Application 09/623,068 claims priority from PCT/US99/04376 filed (2/26/99). PCT/US99/04376 claims priority from US Provisional applications: 60/076182 filed 27Feb1998, 60/086947 filed 27May1998, 60/076102 filed 26 Feb 1998 and 60107673 filed 7 Nov 1998. Each of the following patent applications are incorporated herein by reference in their individual entireties: U.S. Provisional Patent Application 60/230570, PCT/US99/04376, U.S. Patent Application 09/623,068, and U.S. Patent Application 09/947,768.

JBH 3-26-04

The reader's attention is directed to the following documents or papers each of which is open to the public and each of which is incorporated by reference herein in their entirety: (1) McGinnis, Ewens & Spielman, Genetic Epidemiology 1995 ; 12(6) : 637-40. (2) RE McGinnis Annals of Human Genetics vol 62, pp. 159-179

Technical Field

Versions of the present invention are in the field of molecular biology, some versions are specifically in the area of finding the chromosomal location of genes that cause genetic characteristics such as human disease.

Background

Introduction

Conventional linkage study techniques have limited power to localize trait causing genes (trait causing polymorphisms) of modest effect, such as many human disease polymorphisms. The two-dimensional linkage study techniques of this application are powerful new techniques for localizing genes (polymorphisms) especially of modest effect.

Chromosomes, heredity, genes, markers and alleles

Chromosomes are large molecules that carry the information for the inheritance of physical (genetic) characteristics or traits. In human beings for example, parents pass a copy of half of their chromosomes to their offspring during reproduction. By doing this, each parent passes some of his or her physical characteristics to his or her offspring. Any chromosome of a living creature is made of a large string-like molecule of DNA. Chromosomes are essentially very long strings of DNA. Genes are small pieces of a chromosome that cause or determine inherited genetic characteristics. (In this application, the term gene means a polymorphism that determines a genetic characteristic; the term does not mean an entire gene structure with a promoter region, introns, etc..) Markers are any segment of DNA on a chromosome which can be identified and whose chromosomal location is known (at least to some extent). Markers are like milestones along the very long string-like molecule of DNA which makes up a chromosome. Both a gene and a marker can come in different forms on different chromosomes. These